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Kapuskasing.

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BACKGROUND STUDIES OF THE TERRESTRIAL
ENVIRONMENT IN THE VICINITY OF THE
SHERRITT-GORDON MINES LIMITED
CARGILL PHOSPHATE COMPLEX NEAR KAPUSKASING 1982

INVESTIGATORS IN CHARGE

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INTRODUCTION

The original mining interest in the area was prompted by the discovery of a high metallic anomaly in Cargill Township located 25 miles southeast of Kapuskasing. In 1954 the Continental Copper Mines Limited staked the anomalous areas. This was followed in 1955 a diamond drilling campaign. Nothing of economic interest was found, however, as a result of the work done, Continental Copper was able to obtain leases on 21 claims.

In 1969, Kennco Exploration optioned the Continental Copper Mines Limited claim group. Airborne and ground magnetic surveys were followed by a drilling program. The primary objective of this program was copper mineralization and as no significant copper values were found, the option was dropped. Kennco believed that the phosphate was associated with copper as is the case with the Palabora deposit in South Africa.

In 1974, International Minerals and Chemical Corporation Limited evaluated the complex for the phosphate potential. This company staked 344 claims and signed an option agreement with Continental Copper Mines Limited for their 21 claims and carried out a joint program in 1975-76. The drill program indicated approximately 62.5 million tons of material grading 20% P_2O_5 .

In 1979, Sherritt-Gordon Mines Ltd. signed an option agreement with International Minerals and Chemical Corporation Limited for the property. The main attraction to Sherritt was the possibility of providing the fertilizer options with one of its raw materials: phosphate rock. The Cargill phosphate deposit is a relatively small, high grade zone of secondary enrichment formed by chemical weathering of the surrounding carbonatite rock. Carbonatite is intrusive, igneous rock. Ore materials, residuum and leached carbonatite are generally fine grained and unconsolidated but have high moisture content. Most of the deposit is covered by a layer of glacial till. This layer is up to 15 meters thick in places and is a mixture of sand, silt, clay and numerous boulders. The entire area is blanketed by 6 to 18 meter layer of soft green gray clay, probably of glacial lacustrine origin. This in turn is covered by a 2 meter layer of stiff, brown varved clay. A drill program by Sherritt along with the construction of a test pit which involved the removal of a 140,000 cubic yards of overburden, was carried out in 1981. Sites were then chosen and surveyed for the concentrator building, gypsum pond, tailings pond and river diversion. A winter road was constructed into the property from Highway 11. This site plan is shown in Figure 1. The future of this project is dependent on the cooperation of a number of agencies.

BACKGROUND INVESTIGATION

The Cargill phosphate complex site was visited on June 2, 1982. The open pit was being dewatered and it was apparent that approximately 10 m of overburden had to be removed to get at the phosphate deposit. The overburden waste disposal area at the time of the investigation was approximately 5 hectares. The immediate area surrounding the open pit and disposal area is relatively flat to gently rolling. The lower flat areas are primarily black spruce bogs with an occasional mixture of white cedar and tamarack. The slightly higher areas supported stands of balsam poplar, black spruce, white birch, speckled alder, and trembling aspen.

Foliage from several plant species were gathered in triplicate for chemical analysis. These species are listed as follows: white birch, balsam poplar, trembling aspen, speckled alder, beaked hazel, red elderberry, red ozier dogwood, mountain ash, black spruce, balsam fir, raspberry, forage, laborator tea, shining club moss, Usnea, and sphagnum moss. Triplicate samples of 0-5 cm, 5-10 cm, and 10-15 cm levels of soil were sampled. Bulk samples were gathered from four piles of phosphate concentrate. Each pile was a different colour (brown, light gray, dark gray, and gray brown). Vegetation samples were oven-dried, ground in a Wiley mill, placed in glass jars in the Sudbury laboratory, then forwarded to the Toronto laboratory for analysis. The soil and concentrate samples were air-dried, ground in mortars, sieved through 45 mm mesh sieves and bottled and forwarded to the Toronto laboratory. All samples were analyzed for the following chemical elements: aluminum, calcium, cadmium, copper, iron, fluoride, magnesium, nickel, phosphorus, sulphur, and zinc.

RESULTS

Vegetation

Mean element concentrations measured in the various plant species collected are presented in Table 1. Sphagnum moss and shining club moss samples contained relatively high concentrations of aluminum. Usnea, a lichen, also contained a relatively high amount of aluminum. Sphagnum is a known accumulator of certain elements. Iron content was also high in the sphagnum samples and in the balsam poplar foliage. White birch, balsam poplar and trembling aspen are known accumulators of zinc and this is reflected in the relatively elevated contents of zinc in the collected samples of these species. All other elements tested were considered within normal ranges of content.

Soil and Concentrate

Mean element concentration of the soil and concentrate samples are presented in Table 2. Phosphate content as expected was extremely high (up to 20%) in the concentrate samples. All other elements tested in the soil samples were considered to be within normal ranges of content. Copper and cadmium were somewhat elevated in the concentrate samples but this is considered to be normal.

SUMMARY

The Ontario Ministry of the Environment conducted a pre-operational survey of the Sherritt-Gordon Mines Limited phosphate operation near Kapuskasing in June of 1982. Samples of several native plant species as well as three depths of soil (0-5 cm, 5-10 cm and 10-15 cm) and samples from concentrate piles were collected for chemical analysis. Elevated concentrations of aluminum were found in the moss and lichen samples which are known accumulators of certain elements. Zinc was found in relatively high content in the poplar and white birch samples. These species are considered natural accumulators of zinc. Iron content in the poplar and sphagnum moss was also elevated. The Cargill phosphate complex is still in the planning stages and is dependent on the cooperation of a number of agencies. A more extensive survey will be undertaken if the site is actually brought into production. Depending upon the operation involved, both pre and post operational investigations will be carried out.

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Figure 1 Cargill Phosphate Complex

- ▼ Vegetation Sampling Location
- Soil Sampling Location
- Concentrate Sampling Location

0 100 200 300 400 500
METERS

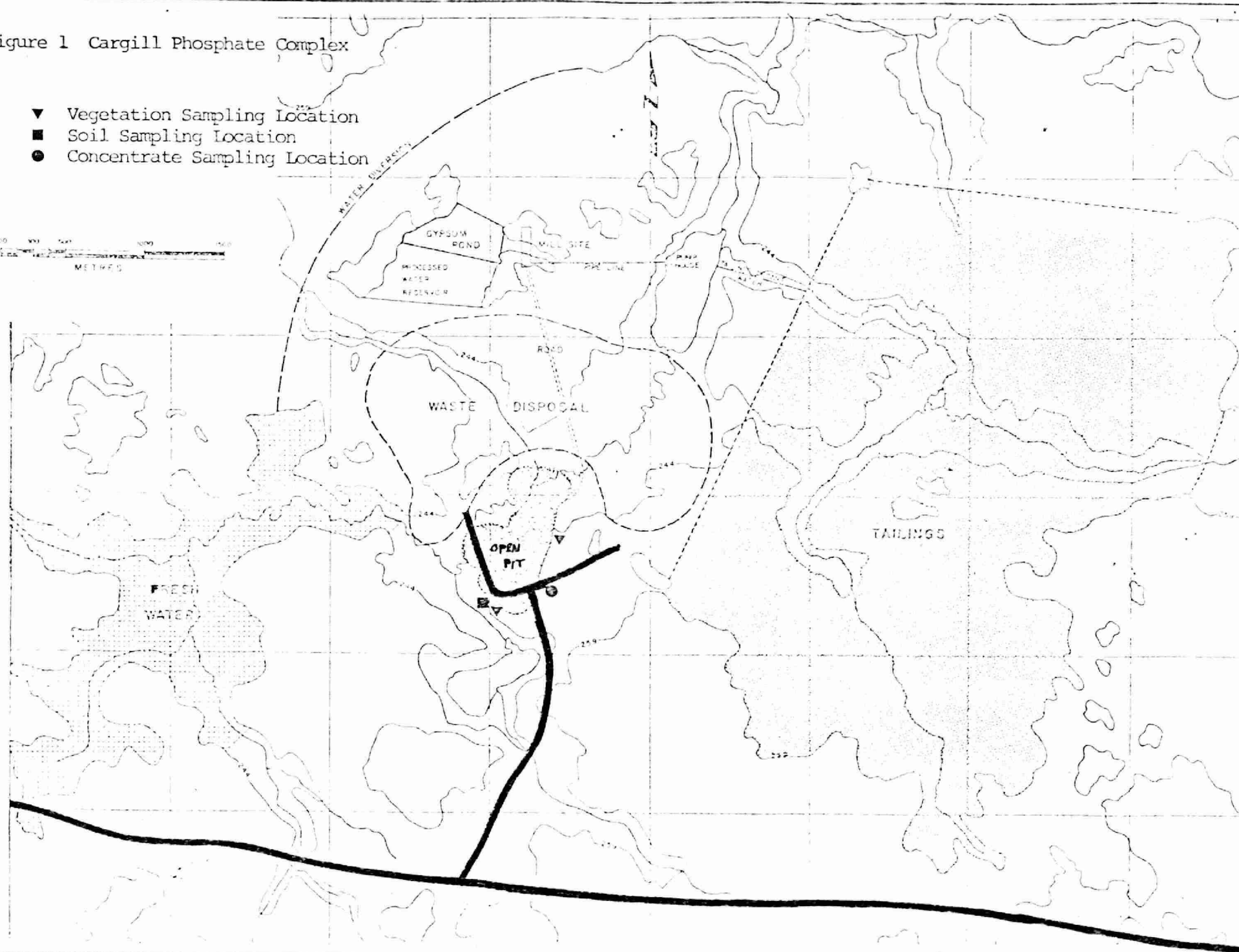


Table 1 Concentrations of various elements in vegetation samples gathered in the pre-operational investigation of the Sherritt-Gordon Mines Limited, Cargill Phosphate Complex near Kapuskasing, June 2, 1982.

Plant Group Species	Fe	P*	Al	Element (µg/g)		Cu	F	Mg	Ni	S*	Zn	
				Ca	Cd							
<u>Hardwood Trees</u>	Trembling Aspen	33	.57	10	4623	.37	10	2.3	2187	2	.29	105
	Balsam Poplar	927	.44	23	9313	.67	12	4.3	4370	4	.30	281
	White Birch	30	.43	27	11243	.47	11	4.3	3020	4	.26	228
<u>Softwood Trees</u>	Black Spruce	10	.91	27	6980	.10	2	2.7	493	1	.04	36
	Balsam Fir	17	.21	53	6857	.17	4	2.0	760	1	.08	53
<u>Shrubs</u>	Speckled Alder	60	.50	30	6610	.10	20	2.0	2127	4	.26	44
	Beaked Hazel	47	.52	20	9667	.10	17	2.3	2677	1	.24	38
	Mountain Ash	27	.45	20	5843	.20	13	1.7	4327	1	.20	23
	Elderberry	47	.54	20	4603	.10	14	4.6	2613	1	.34	35
	Laborador Tea	47	.32	60	5410	.13	4	2.0	1487	1	.08	26
	Red Ozier Dogwood	27	.36	20	12933	.10	8	3.3	3217	2	.45	37
	Raspberry	80	.33	53	5527	.20	10	2.3	3717	2	.20	61
<u>Herbs</u>	Forage	57	.41	37	2870	.17	10.0	2.0	1570	2.3	.30	33
	Shining Clubmoss	443	.20	707	1913	.33	6.7	8.3	1277	1.3	.17	32
	Shagnum Moss	2960	.9	2933	14467	.33	5.3	2.7	3457	3.7	.26	27
	Usnea	227	.15	213	4503	.40	4.0	2.3	570	1.0	.12	55

*Values are reported as percent, all other values are in parts per million.

Table 2 Concentrations of various elements in vegetation samples gathered in the pre-operational investigation of the Sherritt-Gordon Mines Limited, Cargill Phosphate Complex near Kapuskasing, June 2, 1982.

	Fe	P*	Al	Element ($\mu\text{g/g}$)		Cu	F	Mg	Ni	S*	Zn
				Ca	Cd						
Soil 0-5 cm	15500	.21	16800	17413	0.73	45	-	5467	13	0.11	201
Soil 5-10 cm	26367	.08	30800	7623	0.67	17	-	9220	20	0.03	103
Soil 10-15 cm	27433	.087	31533	6367	.20	16	-	9853	22	0.02	95
Concentrate Brown	48933	15.5	11733	259333	0.80	213	11500	1260	2	0.03	122
Concentrate Light Gray	1507	20.2	11567	348000	1.7	98	19667	446	4	0.03	103
Concentrate Dark Gray	5413	20.2	12333	345333	4.07	56	24667	636	53	0.58	321
Concentrate Gray Brown	17250	14.3	18050	283000	3.20	112	15000	3275	29	0.32	316

*Values are reported as percent, all other values are in parts per million

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